WHAT IS CLAIMED IS:

1. A crystallization apparatus comprising:

an illumination system which applies illumination light for crystallization to a non-single-crystal semiconductor film;

a phase shifter which includes first and second regions disposed to form a straight boundary and transmitting the illumination light from said illumination system by a first phase retardation therebetween, and phase-modulates the illumination light to provide a light intensity distribution having an inverse peak pattern that light intensity falls in a zone of said non-single-crystal semiconductor film containing an axis corresponding to said boundary; said phase shifter further including a small region which extends into at least one of said first and second regions from said boundary and transmits the illumination light from the illumination system by a second phase retardation with respect to said at least one of said first and second regions.

2. The crystallization apparatus according to claim 1, wherein said small region has a first small sector which is formed in said first region and transmits the illumination light by the second phase retardation with respect to said first region, and a second small sector which is formed in said second region and transmits the illumination light by the

second phase retardation with respect to said second region.

3. The crystallization apparatus according to claim 1, wherein the first phase retardation is about 180 degrees.

4. The crystallization apparatus according to claim 1, wherein said small region has a shape symmetrical with respect to said boundary.

5. The crystallization apparatus according to claim 1, wherein said phase shifter is disposed in parallel with and in the proximity of said non-single-crystal semiconductor film.

6. The crystallization apparatus according to claim 5, wherein the second phase retardation is about 60 degrees.

7. The crystallization apparatus according to claim 6, wherein said small region has a size a in a lateral direction perpendicular to said boundary within said at least one of said first and second regions, and said size a satisfies a condition $a \geq d \cdot \tan\theta$ which depends on a maximum incidence angle θ of the illumination light incident upon said phase shifter and a distance d between said non-single-crystal semiconductor film and said phase shifter.

8. The crystallization apparatus according to claim 1, further comprising an optical imaging system disposed between said non-single-crystal semiconductor

film and said phase shifter to locate said non-single-crystal semiconductor film and phase shifter at positions conjugated with each other, and the numerical aperture of said optical imaging system on an imaging side being set a preset value required for the light intensity distribution having said inverse peak pattern.

9. The crystallization apparatus according to claim 8, wherein the second phase retardation is about 180 degrees.

10. The crystallization apparatus according to claim 8, wherein said lateral size a satisfies a condition $\underline{a} \leq \lambda/NA$ depending on the imaging-side numerical aperture NA of said optical imaging system and a wavelength λ of the illumination light.

11. A crystallization method comprising:

applying illumination light for crystallization to a non-single-crystal semiconductor film;

phase-modulating the illumination light by using a phase shifter, which includes first and second regions disposed to form a straight boundary and transmitting the illumination light by a first phase retardation therebetween, to provide a light intensity distribution having an inverse peak pattern that light intensity falls in a zone of said non-single-crystal semiconductor film containing an axis corresponding to said boundary; and

transmitting the illumination light through a small region which is formed in said phase shifter and extends into at least one of said first and second regions from said boundary, by a second phase retardation with respect to said at least one of said first and second regions.

12. The crystallization method according to claim 11, wherein said small region has a first small sector which is formed in said first region and transmits the illumination light by the second phase retardation with respect to said first region, and a second small sector which is formed in said second region and transmits the illumination light by the second phase retardation with respect to said second region.

13. The crystallization method according to claim 11, further comprising:

disposing said phase shifter in parallel with and in the proximity of said non-single-crystal semiconductor film.

14. The crystallization method according to claim 11, further comprising:

disposing an optical imaging system between said non-single-crystal semiconductor film and said phase shifter to locate said non-single-crystal semiconductor film and phase shifter at positions conjugated with each other; and

setting the numerical aperture of said optical imaging system on an imaging side to a preset value required for the light intensity distribution having said inverse peak pattern.

15. The crystallization method according to claim 11, wherein said non-single-crystal semiconductor film is crystallized such that a crystal grain is located to include an area reserved for a channel of a thin film transistor.

16. The crystallization method according to claim 15, wherein said crystal grain has a first size in a direction parallel to said boundary and a second size in a direction perpendicular to said boundary, said first size being 1/3 or more of said second size.

17. The crystallization method according to claim 16, wherein said first size W of said crystal grain is 1 μm or more.

18. The crystallization method according to claim 15, wherein said crystal grain grows from a growth start point at an angle of 60 degrees or more as a whole.

19. A phase shifter comprising:

first and second regions disposed to form a straight boundary and transmitting illumination light by a first phase retardation therebetween; and

a small region extending into at least one of said first and second regions from said boundary and

transmitting the illumination light by a second phase retardation with respect to said at least one of said first and second regions.

20. The phase shifter according to claim 19, wherein said small region has a first small sector which is formed in said first region and transmits the illumination light by the second phase retardation with respect to said first region, and a second small sector which is formed in said second region and transmits the illumination light by the second phase retardation with respect to said second region.

21. The phase shifter according to claim 20, wherein the first phase retardation is about 180 degrees.

22. The phase shifter according to claim 21, wherein said second phase retardation is one of about 60 degrees and about 180 degrees.

23. The phase shifter according to claim 16, wherein the location of said boundary is determined with reference to a position for a channel of a thin film transistor.

24. The crystallization apparatus according to claim 5, wherein said small region has a size $\underline{a}$ in a lateral direction perpendicular to said boundary within said at least one of said first and second regions, and said size $\underline{a}$ satisfies a condition $\underline{a} \geq \underline{d} \cdot \tan\theta$ which depends on a maximum incidence angle θ of

the illumination light incident upon said phase shifter and a distance <u>d</u> between said non-single-crystal semiconductor film and said phase shifter.

25. The phase shifter according to claim 19, wherein the first phase retardation is about 180 degrees.

26. The phase shifter according to claim 25, wherein said second phase retardation is one of about 60 degrees and about 180 degrees.